

Harvest Residues of Wheat, Corn, and Sunflower from Combustible Waste to High-Value Raw Materials

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Abstract

It is estimated that up to 150 billion tons of harvest residues, considered agricultural waste or biomass, are produced annually worldwide. After wheat harvesting, 5–7 tons per hectare remain, while corn generates 8–12 tons per hectare, and sunflower leaves behind 4–6 tons per hectare of harvest residues. Burning these residues in the field has detrimental effects on agricultural production. The composition of agricultural waste depends on its source. On average, harvest residues contain approximately 45% cellulose, 25% hemicellulose, and 20% lignin, with the remainder comprising various polar and nonpolar compounds, insoluble ash, and diverse salts. To address this issue, a cost-effective and sustainable process involves the production of micro- and nanocrystalline cellulose, pectin, waxes, and other high-value products with significant commercial and biological activity (e.g., extracts rich in polyphenols or other isolated chemical compounds). These products derived from agricultural waste have broad applications. They can be incorporated into innovative formulations of food, cosmetic, and pharmaceutical products. Their inclusion in these “nature-based” formulations enhances oxidative stability, sustainability, fatty acid composition, fiber content, and other beneficial properties.

Keywords

Harvest Residues, Waste, Cellulose, Waxes, Food Formulations